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FINAL TECHNICAL REPORT FOR NAG 5-3460

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Title of Research: **"Hard X-Ray Emission of X-Ray Bursters"**

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Final Technical Report for the NASA RXTE Grant NAG 5-3460

"Hard X-ray Emission of X-ray Bursters"

Philip Kaaret

The main results from this investigation were serendipitous. The long observation approved for the study of the hard X-ray emission of X-ray bursters lead to, instead, to one of the largest early samples of the behavior of fast quasi-periodic oscillations (QPOs) in an atoll sources. Our analysis of this data set lead to the several important discoveries including the existence of a robust correlation between QPO frequency and the flux of a soft blackbody component of the X-ray spectrum in the atoll source 4U 0614+091.

This investigation provided partial salary and travel support for Eric Ford, Philip Kaaret, and Marco Tavani. Eric Ford, now Dr. Ford, received his Ph.D. from Columbia University in September 1997, based mainly on results obtained under this investigation. Dr. Ford is now a Postdoctoral Research Scientist at the University of Amsterdam. The investigation has lead to several publications in the Astrophysical Journal and one in Science.

Publications from NAG 5-3460:

"Energy Spectra and High Frequency Oscillations in 4U 0614+091," E.C. Ford, P. Kaaret, K. Chen, M. Tavani, D. Barret, P. Bloser, J. Grindlay, B.A. Harmon, W.S. Paciesas, and S.N. Zhang, *Astrophys. J. Letters*, **486**, L47-L50 (1997).

"Using Neutron Stars and Black Holes in X-Ray Binaries to Probe Strong Gravitational Fields," P. Kaaret and E.C. Ford, *Science*, **276**, 1386-1391 (1997).

"Strong-Field General Relativity and Quasi-Periodic Oscillations in X-Ray Binaries," P. Kaaret, E.C. Ford, and K. Chen, *Astrophys. J. Letters*, **480**, L27-L29 (1997).

"Evidence from Quasi-Periodic Oscillations for a Millisecond Pulsar in the Low-Mass X-Ray Binary 4U 0614+091," E. Ford, P. Kaaret, M. Tavani, D. Barret, P. Bloser, J. Grindlay, B.A. Harmon, W.S. Paciesas, and S.N. Zhang, *Astrophys. J. Letters*, **475**, L123-L126 (1997).

"Anticorrelated Hard/Soft X-Ray Emission from the X-Ray Burster 4U 0614+091," E. Ford, P. Kaaret, B.A. Harmon, M .Tavani, S.N. Zhang, D. Barret, J. Grindlay, P. Bloser, and. R.A. Remillard, *Astrophys. J. Letters*, **469**, L37-L40 (1996).